



## CKJ REVIEW

# What should the characteristics and attributes of an accredited nephrology training programme be? Looking for high standards

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## Abstract

The Renal Section of the European Union of Medical Specialists is working towards harmonization and optimization of nephrology training across Europe and its Mediterranean borders. In addition to the need for harmonization of the heterogeneous time dedicated to training, it is necessary to ensure that the learning environment is of a sufficiently high standard to develop skilled specialists. Thus, there is a need to review the core educational infrastructure and resources that should be provided to trainees in order to be considered centres of excellence for nephrology training.

This review addresses most of the characteristics and attributes that constitute a high-calibre training centre of excellence, considering that a training centre might not represent a single institution, but a network of institutions that provide a coordinated and complete curriculum to the trainee.

The training institution should provide, apart from the classical current nephrological facilities (clinical nephrology, haemodialysis, peritoneal dialysis and transplantation), a number of other complementary facilities, including immunology, nephropathology—with a dedicated and expert renal pathologist—all the specialities of general medicine and general surgery and, in particular, vascular surgery, radiology and interventional radiology specialist services (renal biopsy, renal ultrasound and permanent vascular access) and intensive care unit. In addition to clinical training, a training centre of excellence should offer research facilities to allow trainees the opportunity to be involved in epidemiological, clinical, translational or basic scientific research. The training centres should ideally hold a certification of training accreditation.

If the European and its Mediterranean border countries wish to guarantee a high standard of training in nephrology, their national health services need to recognize their responsibility towards the importance of doctor training, providing enough time for educational activities and investing in the resources required for high-standard specialist training.

**Key words:** accreditation and quality in nephrology, education in nephrology, high standards in nephrology

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## Introduction

The Renal Section of the European Union of Medical Specialists (Renal-UEMS) is committed to the harmonization and optimization of nephrology training across member states. Recently, the Renal-UEMS developed updated guidelines outlining the minimum curriculum requirements for training in renal medicine [1].

National training bodies, through regional training centres, are encouraged to implement these recommendations. To ensure that the learning environment is of a sufficiently high standard to develop skilled specialists, there is a need to reflect on the core educational infrastructure and resources that should be provided to trainees by those institutions.

Recently, there has been a shift towards outcome-driven, competency-based training, largely inspired by the Canadian Medical Education Directions for Specialists (CanMEDS) framework [2, 3]. This model recognizes the importance of patient outcome as a yardstick of medical education and has been adopted internationally in the Netherlands, UK, Canada, USA and Denmark. CanMEDS outlines seven fundamental roles of hospital specialists, six of which are generic (communicator, collaborator, professional, scholar, manager, health advocate); here, we focus on the specific needs of nephrology trainees with respect to developing competencies in the seventh CanMEDS role, medical expert [2].

Lane et al. have sought an evidence-based approach to designing a nephrology training programme by first defining what makes an excellent nephrologist [3]. Effective communication was rated highly by patients, while trainees ranked good clinical skills and a strong knowledge base as necessary traits in the pursuit of nephrology excellence [3].

Putting in place a curriculum, framework and resources for nephrology training in Europe is only one side of the coin; the other is they must be implemented. Experienced trainers need to be willing and available to pass on their knowledge to trainees during scheduled, protected teaching sessions. However, 96% of nephrology trainers surveyed from one European country reported that there is insufficient time allocated to teach [4]. An Australian survey found that nephrologists spend ~4 h/week dedicated to teaching [3]. Traditionally, bedside, as opposed to classroom, teaching has played an important role in European medicine; these experiences are more difficult to capture in surveys and should be valued, but are no substitute for didactic sessions [3].

There is an international shortage of nephrology trainees [5]. Reasons for this include an overemphasis on haemodialysis (HD) as a therapeutic option and a lack of ownership of procedures within the specialty [6]. These problems were reflected in a survey of third- and fourth-year European nephrology trainees, where a quarter reported no experience in peritoneal dialysis (PD) and a third had never performed a renal biopsy; half of respondents reported that teaching sessions are delivered only fortnightly, or less frequently [4]. The limited data available suggest that nephrology training programmes across Europe are quite heterogeneous and that there is room for improvement [4, 7]. The current *pro bono*, Hippocratic approach will not stand up to scrutiny.

This article will consider the characteristics and attributes that constitute a high-calibre training centre of excellence, acknowledging that a training centre might not represent a single institution, but may comprise a network of institutions that provide a coordinated and complete curriculum to the trainee. With variations in population density and expertise across European countries, it can be expected that some training centres of excellence will rely on a network of institutions that are geographically

dispersed within each state. In some instances, it might be advantageous for training networks to span international borders. By defining the resources needed for optimal nephrology training, we can provide a platform from which to advance the quality and uniformity of training in Europe.

## Training institutions and patient population

The majority of nephrology specialist training should be delivered in a core tertiary-level referral hospital; time might be spent in associated institutions, but a link to the core institution should be maintained. The core training institution should provide immunology, nephropathology, haematology, obstetric, urology, vascular surgery, palliative care, radiology and interventional radiology specialist services. Ideally, the training institution should have acute medical intake to allow trainees to pursue accreditation in both nephrology and general internal medicine, if desired. An outpatient renal service should be facilitated by the core institution.

The development of paraclinical professional competencies in leadership, communication skills, medical education and fiscal matters should be encompassed in the ethos of the training institution in line with the CanMEDS framework [2].

Many important primary renal conditions are somewhat uncommon [8], and the catchment population served by the training centre should be sufficiently large to maximize the chance of trainees having the possibility of encountering as many types of renal disorders as possible [8]. As an example of patient volume for renal replacement therapy (RRT), the Royal Australian College of Physicians (RACP) recommends that each trainee should be involved in the management of 50 HD patients, 50 PD patients and 10 home HD patients under clinical supervision [9]. This equates to ~17 PD patients per year. The Swiss curriculum prescribes exposure to at least 20 patients requiring continuous RRT (CRRT), 50 patient-months of PD and 200 patient-months of HD [10]. These figures cannot be applied to all European institutions due to population variations, but can be viewed as a guide [6, 11, 12]. European trainees should expect intense exposure to renal patients with an emphasis on quality rather than quantity.

## RRT facilities

A centre of excellence should include acute HD facilities, an in-centre chronic HD unit and a PD unit. The trainee should benefit from regular, trainer-led HD ward rounds. Exposure to PD is particularly problematic, as its rate varies dramatically between countries (Sweden 24% of RRT, Germany 5% of RRT), for various reasons [11]. This is amid growing concern that nephrology trainees are not getting enough experience with PD and are overburdened with HD [6, 11, 12]. Having both HD and PD modalities available at the centre will involve trainees in deciding which option is preferable for individual patients.

The centre of excellence training network should include an intensive care unit, where trainees can gain experience starting, prescribing, managing and withdrawing CRRT in patients with acute kidney injury. Ideally, the training network should facilitate home HD, as these patients present unique clinical challenges.

## Transplantation

Competent care of patients pre-transplantation, during the early post-transplant period and long term is a requirement of the

Renal-UEMS curriculum. In particular, this demands an understanding of transplant immunology, the anatomy related to renal transplantation and a sound knowledge of immunosuppressive therapy. Trainees should be afforded the opportunity to gain experience in the early postoperative care of transplant patients, the initiation and monitoring of immunosuppression under clinical supervision and should expect to be involved in the clinical care of patients with infectious complications and graft rejection during both early and late stages of transplantation. Dedicated teaching sessions delivered by surgeons and physicians who specialize in the area of renal transplantation should be scheduled as part of the training programme.

The US Accreditation Council for Graduate Medical Education advises a minimum of 2 months experience on an active renal transplant service and care of at least 10 postoperative transplant patients [13]. The Swiss curriculum prescribes care of at least 20 patients immediately post-transplantation [10]. Realistically, these experiences require exposure of the trainee to acute renal transplantation for at least 6 months. Thus, it is necessary that each centre of excellence includes a transplant unit as part of its network of institutions.

## Research

Each centre of excellence should offer research facilities through an affiliated university or an integrated research network to allow trainees the opportunity to be involved in epidemiological, clinical, translational or basic scientific research. Rehearsing trainees in rigorous scientific method by involving them in well-designed research is desirable, as it develops critical thinking and creative approaches in all aspects of professional practice. Involving trainees in the early stages of nephrology research should make them more forward thinking, aspire to greater care for renal patients and give them ownership of the future direction of their chosen specialty.

## Procedures and interventions

The Renal-UEMS guidelines divide procedural skills into those that are considered mandatory (placement of temporary vascular access under ultrasound guidance) and those that are optional (renal biopsy, renal ultrasound and permanent vascular access). Over-dependence on other specialties has been cited as a deterrent from training in nephrology [12, 14]. Outcomes with paracentesis, for example, are worse when interventional radiology is relied on compared with the medical specialist [15]. The nephrologist is in the best position to advocate for their patient's renal health and understands, better than other specialists, the importance of timeliness when it comes to establishing access for emergent RRT and other procedures [14, 16].

It is therefore required that training institutions provide, at a minimum, the necessary equipment for temporary vascular access placement, including an ultrasound machine with vascular probe [12, 15]. Simulation-based training should be used where possible, as it has an established record in teaching safe and effective central venous catheter (CVC) insertion [14]. The number of supervised CVC insertions required before success and complication rates plateau is just 10 [17]—this is reflected in the RACP recommendation of 10–20 access device placements over 3 years [9, 16].

Trainees should expect adequate supervision from an experienced trainer when learning new, invasive procedures. Support from other specialties such as urology, vascular surgery and

interventional radiology should be accessible in the event of complications.

Regardless of who the interventionalist is, trainees should know the indications for and complications of all procedures undertaken for the purposes of renal diagnostics (biopsies) and RRT (vascular access, fistula formation, fistula maintenance).

Nephrologists are performing fewer renal biopsies, although sample adequacy is less likely to be optimal when the biopsy is performed by other specialists [16]. The RACP suggests that their trainees carry out a minimum of 20–50 renal biopsies [9], similar to Switzerland [10]. The competency-based assessment approach in the UK moves away from prescribing a minimum requirement and focusses on the ability to demonstrate proficiency [18]. For each new procedural skill undertaken by the trainee, the aim is that they gain enough experience under supervision to be able to perform the skill independently rather than perform a set number [9].

Rotation through an intensive care unit is desirable as it affords trainees ample opportunity to gain experience in central venous access placement and management of CRRT.

While the Renal-UEMS curriculum does not include Tenckhoff catheter insertion as a mandatory skill, some programmes might find it desirable. Where this procedure is not performed by nephrologists, the training centre should have a surgical team that inserts Tenckhoff catheters, enabling trainees to become familiar with the management of such patients perioperatively.

Nephrologists have demonstrated greater clinical aptitude for assessing urine microscopy than their laboratory counterparts, making urinalysis another desirable skill for trainees [19]. To facilitate this, training institutions should provide a centrifuge and microscope. Trainees should expect to have the technique and interpretation of microscopy demonstrated to them by an experienced trainer.

The centre of excellence should offer trainees elective placements in subspecialty areas such as renal ultrasonography, Doppler fistula studies, renal palliative care, renal histopathology and plasma exchange.

## Clinico-pathological correlation

Evaluation of the renal biopsy and its correlation with clinical findings was fundamental to the establishment of nephrology as a medical specialty and continues to be pivotal today [16]. Each centre of excellence should ideally have a dedicated renal pathologist on its faculty to offer training in biopsy interpretation. Trainees should be afforded the opportunity to see histopathology from patients they have treated and be involved in the discussion at multidisciplinary biopsy meetings. If an individual institution does not have a throughput of renal biopsies high enough to support this, then centralization of renal biopsy interpretation combined with teleconference discussion offers a good alternative.

## Governance, accreditation and assessment

European countries operate various systems of governance over their respective nephrology specialist training schemes. In both the UK and Ireland, national colleges (Royal College of Physicians and Royal College of Physicians of Ireland, respectively) oversee the implementation of training schemes in hospitals across each country. In France and Belgium, on the other hand, each university directs its own nephrology scheme (Diplôme d'Études Spécialisées) and is answerable, ultimately, to the relevant government ministry. By setting out a curriculum for nephrology

training and making recommendations about its implementation, the Renal-UEMS would become an intermediary in this system and would have to seek approval from the supreme authority in each state before being able to hold individual centres of excellence accountable for maintaining standards [20].

Ideally, all training centres should hold a certificate of training accreditation. However, direct inspections can be a difficult task for logistical reasons. To our knowledge, there are neither guidelines on accreditation of nephrology training centres specifically nor universal acceptance of how a centre should be assessed for accreditation. In some countries (e.g. Ireland), the national training bodies carry out inspection visits on a 5-year basis, while others (such as UK) have abandoned this practice. In Australia, a self-reporting system is used, and site visits are carried out when concerns are raised [9].

The challenge for a programme to be truly regarded as a centre of excellence is to maintain accreditation based on certain pre-specified criteria. In line with this, we recommend that a training centre of excellence would have a programme director with dedicated time. In the USA, 20 h/week is mandated by the Accreditation Council for Graduate Medical Education, with appropriate institutional support. Additionally, a centre of excellence must have a minimum commitment to training of at least 10 h/week, and the ratio of staff to trainees should not fall below 1:1.5 [21].

The assessment of trainees' core skills and competencies is another challenge. The UK has both a system of assessments during training and a mandatory nephrology examination, as do other European countries. Similarly, in Australia and New Zealand, nephrology trainees partake in regular formative and summative assessments with their trainer (case-based discussions, clinical assessments, progress reports, annual projects) [9]. In the USA, trainees undergo in-training examinations that assess the performance of training programmes as well as the individual trainee. To be certified as a nephrologist with the American Board of Internal Medicine, they have to sit an 'exit' exam. In Brazil, a final exam is not compulsory but can be sat by those seeking higher recognition.

Within Europe, assessment methods vary between countries. Most training bodies require a log book to document training activity. In some, but not all, countries, the final award of specialist requires satisfactory completion of a formal 'exit' exam.

The UEMS has adopted a competence-based approach and established the European Council for Accreditation of Medical Specialist Qualifications (ECAMSQ) to assess trainees' knowledge, professionalism and practical skills [20]. This body aspires to execute its role through using an online ePortfolio, directly observed procedural skills (DOPS) and multiple choice question exams [20]. These assessments will be rolled out for nephrology trainees as part of the harmonization process.

A precedent has been set in the field of intensive care medicine (ICM), where the European Society of Intensive Care Medicine has developed the European Diploma of Intensive Care (EDIC). This qualification is becoming internationally recognized as an 'exit' exam for ICM.

Assessment should not only be seen as a test of the trainee's ability, but might be more appropriately viewed as an evaluation of the training programme itself. For this reason, it is desirable that some objective measure of a trainee's progression through the programme is taken.

## Electronic resources

The Internet lends itself greatly to the harmonization of nephrology training and should be embraced [22]. Learning material and training modules could be made available through a website

maintained by a central European nephrology training body and accessed freely by registered nephrology trainees across member states. This would guarantee uniform exposure of trainees to high-quality training material and allow the standard to be set by a central body. The ERA-EDTA website ([www.era-edta.org](http://www.era-edta.org)) already provides online learning material for members. Other online nephrology teaching resources such as the ERA-EDTA YouTube channel (<https://www.youtube.com/channel/UCBE2gZzF2iVyB2CLogpGsKg>) and Nephrology On-Demand Histopathology have been validated and supported by the literature [23, 24].

## Moving towards standardized training across Europe

The Bologna Declaration (1999), introduction of the European Credit Transfer System (ECTS), and European directive 2005/36/EC have opened the door to mutual recognition of higher education and professional qualifications across states within the European Union. Going from this to harmonization of specialist vocational training in clinical nephrology is not a big leap, but challenges remain. The infrastructure is falling into place, but goodwill and co-operation will be required to consolidate efforts.

A uniformly excellent level of training for European nephrology trainees can be assured by (i) setting out a curriculum, which we have previously published [1]; (ii) instituting competence-based assessment through ECAMSQ [20] and (iii) regulating how training is delivered, which is what this article discusses.

The duration required in specialized nephrology training is highly variable among European countries, ranging from 2 to 4 years, with an average of 3.1 years, which currently happen after a variable period of general training (from 1 to 5 years), except in two of the European countries (Table 1). These data compare to 2 years in the USA [13] and Brazil, for example, and 3 years in Australia and New Zealand [9]. These differences within Europe are to be expected and do not preclude the harmonization of training. Different political, geographical and population factors lead to variations in the time required to gain adequate experience in each country.

In the current sociopolitical climate, most European countries have moved towards publicly funded universal healthcare. While specialist training typically takes place in public hospitals, the bodies overseeing this training are usually private, independent organizations that have no control over the state-run health service. Due to the economic pressures seen within public healthcare systems, specialist nephrology trainees and trainers struggle to meet the demands of their clinical duties, leaving little or no dedicated training time. In essence, the employer's needs are divorced from those of their employees.

However, working in a busy clinical environment is not without its merit, as a high turnover of patients provides invaluable experience to the trainee. This could even be seen as an advantage that European trainees have over their American counterparts, where patient exposure can be more controlled. Ideally, a compromise should be struck between intense clinical experience and formulated core teaching.

The national health services of Europe need to recognize their responsibility towards and the importance of doctor training. If European countries wish to guarantee a high standard of nephrology care for their citizens, they should engage with specialist training bodies, reimburse trainers (and trainees) for time spent at educational activities and invest in the resources required, as outlined in this article, for high-standard specialist training.



**Table 1.** Training years post-registration to attain higher specialty certification in nephrology based on survey of countries represented at UEMS Renal Section 2015

Country	Total years post-registration	General years	Nephrology
Spain	4	1	3
Israel	6	4	2
Ireland	6	2	4
Germany	6	3	3
Portugal	5	1	4
Czech Republic	4	0	4
Sweden	5	2	3
Denmark	7	3	4
Austria	6	3	3
Finland	6	3	3
Estonia	4	0	4
Switzerland	6	3	3
Hungary	6	2	4
Slovenia	6	2	4
UK	7	4	3
Croatia	5	3	2
The Netherlands	6	4	2
Romania	4	2	2
Norway	6.5	3.5	3
France	4	2	2
Slovakia	6	2	4
Greece	6	2	4
Bulgaria	4	1	3
Belgium	6	4	2
Bosnia and Herzegovina	5	3	2
Kosova	5	2	3
Turkey	7	4	3
Italy	4	1	3
Montenegro	7	5	2

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**Conflict of interest statement**

None declared.

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